equipment which is software-controlled will enable Verizon to test and provision lines remotely and eliminate the costs associated with field dispatches. Tr. 3896-3898 (Riolo).

Although Verizon claimed in its surrebuttal that it made a forward-looking adjustment for expected productivity gains in a forward-looking network, Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 21-22, Verizon was forced to admit during the hearing that the productivity adjustment was based on labor productivity gains that have occurred in its existing network, not gains it would expect to occur in a forward-looking network. WorldCom Ex. 108; Tr. 3793, 3795 (Minion) (agreeing that the adjustment Verizon makes for productivity is based on the productivity gains it experiences in its embedded network from year to year).[104] As Mr. Minion acknowledged, "[t]he productivity reflected here reflects the actual achievable expected productivity gains for the network that truly will be in place in the future over the planning period, and it's not trying to approximate or not designed to approximate any productivity gain of a hypothetical theoretical construct, which is not going to be built." Tr. 3795-96 (Minion).

Even if use of embedded productivity gains were appropriate – which it is not – Verizon has failed to demonstrate that its limited productivity adjustment is sufficient. Verizon has not provided any back-up data to show historic productivity and has no time and motion studies that calculate the productivity adjustment or disaggregate the expected productivity gains for workers from different types of plant. Tr. 3907-08 (Minion). Moreover, Verizon calculates productivity gains for labor productivity only, not for total factor productivity. Tr. 3880 (Minion).

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[104] Verizon also eliminated retail-related expenses from its 1999 expenses. Verizon claimed on surrebuttal that this was a forward-looking adjustment, Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 21, but it admitted during the hearings that this is not a forward-looking adjustment. Tr. 3782-83 (Minion). Moreover, in ostensibly removing retail-related costs, Verizon did not remove all potentially avoidable costs in the long run. Tr. 3812-13 (Minion).

Indeed, Verizon's labor productivity adjustment is so small that it is more than offset by a second adjustment – an adjustment for labor inflation. Those adjustments in 2001 in Verizon's models are approximately the same as those in 1999, and expenses in 2003 are actually higher than in 2001. WorldCom Exh. 107 (lines 61 and 64); Tr. 3794-95, 3802-03 (Minion).[105] In contrast, during the cost proceedings in New York, Verizon proposed a productivity adjustment of 2% above inflation for network-related expenses and 10% above inflation for non-network-related expenses, and Judge Linsider ultimately recommended an adjustment of 3% above inflation for network expenses and 12% above inflation for non-network expenses. Tr. 3804-05 (Minion). *Cf. Universal Service Tenth Order* ¶383 (adopting a productivity factor of 6.0% for 1997 and 1998 for common support services expenses). In Virginia, Verizon proposes a much smaller adjustment – certainly not one that accounts for productivity gains that will occur in a forward-looking network.

As part of its expense calculations, Verizon takes the "forward-looking" expenses it has derived by adjusting 1999 expenses to 2001 levels and divides these expenses by its embedded investments as of 1999. AT&T/WCOM Exh. 12 (AT&T/WorldCom Recurring Cost Panel Reb.) at 85-86. Verizon then divides this expense-to-investment ratio by a Forward Looking Conversion or "FLC" factor based on the ratio of forward-looking to embedded

[105] While Verizon's Model documentation shows how 2002 expenses are calculated from 2001 expenses, it does not show how 2001 expenses are calculated from 1999 expenses. Indeed, the 2001 expenses are almost identical to 1999 expenses. During the hearing, Verizon indicated that it used the same process to adjust 1999 expenses to 2001 expenses as it used to adjust 2001 to 2002 expenses. Tr. 3786-89, 3801-02 (Minion). The documentation shows how this process works. For example, Verizon calculates the maintenance expense for poles in 2002 by multiplying expense for poles in 2001 by an index of labor cost inflation and an index of labor productivity. WorldCom Ex. 106, line 26, applying indices found in WorldCom Ex. 107 at lines 58 and 61. Line 60 of WorldCom Exhibit 107 shows the productivity adjustment from 2001 to 2002 and 2002 to 2003. Use of this process to adjust 1999 levels to 2001 levels yields 2001 values that are almost identical to the 1999 values because the labor productivity and labor inflation adjustments made by Verizon almost exactly cancel each other out.

investments. Verizon's application of a FLC factor means that whatever expenses are input into the numerator of the initial expense-to-investment ratio are the expenses that Verizon ultimately claims to be TELRIC expenses. WorldCom Exh. 105; Tr. 3777-79, 3781 (Minion) (agreeing that it is "absolutely correct" that the expense put into the numerator of the equation is what comes out of the equation). Verizon's use of an expense-to-investment ratio and FLC factor essentially cancel out,[106] leaving Verizon's 1999 expenses with the productivity and inflation adjustments discussed above as Verizon's claimed TELRIC expenses. There is nothing forward-looking about this process.

Because Verizon fails to calculate forward-looking expenses from the bottom up and adjust expenses appropriately, AT&T and WorldCom have restated expenses in Verizon's studies by taking a ratio of 1999 expenses to investments and applying that to forward-looking investments to arrive at forward-looking expenses. By calculating an existing expense-to-investment ratio and assuming this ratio will be constant in a forward-looking network, forward-looking expenses can be calculated once forward-looking investments are known. This approach is used because of the difficulty of making an independent assessment of forward-looking expenses.

AT&T and WorldCom have performed this calculation by removing the FLC factor from Verizon's expense calculations so that forward-looking-expenses can be determined based on forward-looking-investments. AT&T and WorldCom also adjusted the embedded investments to 1999 levels using Current Cost to Booked Cost ("CC/BC") ratios.[107]

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[106] They do not exactly cancel out because Verizon estimates the FLC factor ahead of time based on a projection of what it expects the Commission will determine are TELRIC investments.

[107] Verizon conceptually does not disagree with the application of CC/BC ratios, and AT&T and WorldCom have explained their importance. AT&T/WCOM Exh. 12 (AT&T/WorldCom Recurring Cost Panel Reb.) at 85-86. *See also Universal Service Tenth Order* ¶ 371 (describing importance of CC/BC ratio). In fact, Verizon used CC/BC ratios and no FLC in its first UNE cost study submitted before the Virginia State Corporation Commission. However, Verizon

(2) Land and Building Factors

Verizon inappropriately applies a FLC factor to the land and building factor. Verizon applies its FLC factor to the switch investment included in the denominator of the land and building ratio, thus reducing the denominator and increasing the resultant ratio. Verizon claims the FLC factor is reasonable because switch costs will decline in the forward-looking environment, and application of a land and building factor based on the existing relationship of land and building investment to switch investment will understate forward-looking land and building investment. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 52. In a forward-looking network, however, switch equipment and remote terminals will occupy less space than in Verizon's embedded network, and as a result land and building investment will decrease. Use of a FLC factor assumes that land and building expenses will remain constant in a forward-looking network.

Verizon argues that if the FLC factor is removed, then a CC/BC factor must be applied. *Id.* at 51. Again, Verizon's logic is flawed; the land and building investment in the embedded network reflects older buildings built to accommodate oversized and outdated analog switches. Applying a CC/BC ratio to these embedded investments without a corresponding downward sizing adjustment will overstate forward-looking land and building investment.

(3) Y2K Expenses

Verizon's 1999 operating expenses included a one-time expenditure of **BEGIN VERIZON PROPRIETARY** *** [redacted] *** **END VERIZON PROPRIETARY** for expenses related to Y2K. That expenditure is not one that will occur annually in a forward-looking network and should therefore be excluded. AT&T/WCOM Exh. 12 (AT&T/WorldCom

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argues that if CC/BC ratios are applied, the FLC factor will need to be adjusted accordingly to ensure expenses are recovered at their embedded levels. Verizon's arguments against use of a CC/BC ratio in the absence of a FLC factor are simply efforts to promote the use of a FLC factor and thereby frustrate the determination of forward-looking costs.

Recurring Cost Panel Reb.) at 92; Tr. 3826-27 (Minion). Verizon acknowledges that Y2K expenses were incurred but asserts that its 1999 Y2K expenditures crowded out other expenses in 1999 and suggests that its expenses would have been the same in 1999 even without the Y2K expenditure.[108] Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) As evidence, Verizon asserts that its 2000 operating expenses were higher than its 1999 expenses. *Id.* at 40.

But it is Verizon that chose 1999 as the base year, Tr. 3824 (Minion), and Verizon that chose to provide back-up data for 1999, not 2000. *Id.* at 3825. AT&T and WorldCom have not been provided the necessary 2000 expense data to determine whether the 2000 expenses included one-time changes that would not exist in a forward-looking network (Tr. 3828-29 (Minion)) or whether they include expenses that have been inefficiently incurred. The 1999 expenses included the Y2K expenses that clearly are not forward-looking. Indeed, in his recommended decision in New York, Judge Linsider agreed with AT&T and WorldCom that Y2K expenses should be removed. Tr. 3829 (Minion).

(4) Advertising Expenses

Verizon's cost study improperly attempts to charge CLECs for Verizon's *retail* advertising. AT&T/WCOM Exh. 12 (AT&T/WorldCom Recurring Cost Panel Reb.) at 93. In response, Verizon contends that its retail advertising expenses are a surrogate for wholesale advertising expenses that would exist in a forward-looking network. Tr. 3830 (Minion). Indeed, Mr. Minion suggested that in the future "I would be very surprised if James Earl Jones was not on TV advertising UNEs." Tr. 3830-31 (Minion).

That is absurd. Verizon admits that it does almost no wholesale advertising today and offers no evidence that wholesale advertising would likely increase significantly – let alone

[108] Even if Verizon were correct that Y2K expenses crowded out other expenses, this would suggest that the other expenses were unnecessary. Thus, it would remain the case that forward-looking expenses should be calculated after removing Y2K expenses.

approximate the level and expense of retail advertising. Verizon offers a single example of a wholesale advertising campaign directed at the public -- the "Intel inside" advertisements. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 43. But this example is inapposite – Intel is not a retailer whose advertising campaign on behalf of wholesale products could help its retail competitors. In any event, it should be the choice of a CLEC whether – and to what extent – it wants to advertise. A CLEC should not be forced to pay Verizon to advertise for it through an advertising campaign directed at the CLEC's customers.

With respect to advertising directed at the CLECs themselves, the CLECs are knowledgeable consumers and will purchase based on price, not advertising. Indeed, advertising will make it less likely that CLECs purchase Verizon UNE elements because such advertising raises the UNE prices. Clearly, there will be no expensive mass media advertising to market UNEs to CLECs.

(5) Merger Savings

Verizon convinced regulators to approve the Bell Atlantic/NYNEX and Verizon/GTE mergers in part by describing efficiencies it anticipated would result from those mergers. Verizon included such savings in the cost models it presented in New York, and Judge Linsider's recommended decision included such savings. Tr. 3835 (Minion). But Verizon did not include any projected savings from its mergers in its Virginia cost models.[109] AT&T/WCOM Exh. 12 (AT&T/WorldCom Recurring Cost Panel Reb.) at 87- 88; AT&T/WCOM Exh. 11 (Murray Reb.) at 37-38. In their restatement of Verizon's studies, AT&T and WorldCom included the merger savings that Verizon proposed in the New York proceeding (WorldCom Ex. 113) – a combined 2.6% reduction in the joint and common cost factor.

[109] Verizon also included expenses associated with the mergers in its cost calculations. WorldCom Ex. 112; Tr. 3901-04 (Minion).

In response, Verizon contends that it implicitly incorporated merger savings through its productivity adjustments. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 47-48. But, as discussed above, Verizon's productivity adjustments are based on labor productivity gains in its embedded network and do not include any additional productivity gains from the mergers. Moreover, in New York, Verizon included merger savings in its cost models despite inclusion of *greater* productivity adjustments than it proposes here. Tr. 3835 (Minion).

Verizon next argues that AT&T and WorldCom cannot use the New York savings in any cost restatement because Verizon's New York filing "also included an approximation for the costs associated with ongoing reorganizations of the workforce." Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 49. But Judge Linsider rejected these costs (Tr. 3835 (Minion)), and Verizon provides no estimate of any such costs in this proceeding. In any event, as noted above, Verizon already includes expenses associated with the mergers in its cost calculations.

(6) Nonrecurring and Other Support Factor Adjustments

In their restatement of Verizon's costs using Verizon's cost Model, AT&T and WorldCom added some costs that are appropriately recovered as recurring costs, after subtracting these costs from Verizon's non-recurring cost model. AT&T/WCOM Exh. 12 (AT&T/WorldCom Recurring Cost Panel Reb.) at 93-94.

F. Loop Costs

The Synthesis Model calculates loop costs by determining how an efficient network would best be constructed. It does not take as given the routes, utilization levels, or technology mix in Verizon's embedded network. By contrast, Verizon's models begin with its embedded network – or in many instances its network as it existed in the early and mid-1990s. Verizon attempts to make the Models forward-looking by changing the technology mix to match

the expected mix of Verizon's purchases over the next three years. However, the technology mix Verizon expects to purchase in the next three years is not a forward-looking mix because it is significantly constrained by the network Verizon already has in place. Moreover, changing the technology mix is only one of the many changes needed to make the Models forward-looking. As this Commission has explained:

> While we recognize that certain factors such as terrain, road networks, and customer locations are fixed, the design of the existing networks under these conditions may not represent the least-cost, most efficient design in some cases. . . . Existing incumbent LEC plant is not likely to reflect forward-looking technology or design choices. Instead, incumbent LECS' existing plant will tend to reflect choices made at a time when different technology options existed or when the relative cost of equipment to labor may have been different than it is today. Incumbent LECs' existing plant also was designed and built in a monopoly environment, and therefore may not reflect the economic choices faced by an efficient provider in a competitive market.

Universal Service Fifth Order ¶ 66. *See also* Universal Service Tenth Order ¶ 63.

This section of the brief discusses loop modeling and associated input issues. In some instances, a particular loop input may be used in different ways in the Synthesis Model and Verizon's models, and insight can be gained into input issues by discussing them back-to-back for the two models. Given the different loop inputs, AT&T and WorldCom have presented a restated version of Verizon's cost models using appropriate inputs.

1. Line counts

a. Line counts in the Synthesis Model

In calculating costs per line, the Synthesis Model spreads costs over a projected line count for mid-2002. This 2002 line count in the middle of the three-year planning period is

used so that Verizon does not overrecover its costs.[110] Verizon does not dispute the appropriateness of using a mid-2002 line count. Verizon claims, however, that AT&T and WorldCom overestimate the number of lines in mid-2002 because some of the increase in ARMIS special access lines in 2000 resulted from a reporting change rather than line growth. Verizon Exh. 109 (Tardiff Reb.) at 29; Verizon Exh. 108 (Murphy Reb.) at 30, 114. Verizon's claim is without merit.

After Verizon raised the ARMIS special access line reporting changes, AT&T and WorldCom adjusted the Synthesis Model based on discovery responses to reduce the DS-0 equivalents in the Synthesis Model from 2.8 to 2.1 million. AT&T/WCOM Exh. 14 (Pitkin Surreb.) at 72. This number is actually substantially understated, as it does not include all non-switched lines. Verizon made clear in discovery that ARMIS data do not include all non-switched lines and that, when all non-switched lines are included, Verizon has forecasted approximately **BEGIN VERIZON PROPRIETARY** *** □□□□□□□□ *** **END VERIZON PROPRIETARY** DS-0s for 2002. Rather than understating costs, as Verizon suggests, the line count used by AT&T and WorldCom substantially overstates costs.

Verizon also contends that the growth in line counts would not all occur at existing customer locations, as assumed by the Synthesis Model, Verizon Exh. 108 (Tardiff Reb.) at 30; Verizon Exh. 109 (Murphy Reb.) at 116, and would be geographically concentrated given the growth in special access lines. Verizon Exh. 108 (Tardiff Reb.) at 30; Verizon

[110] To take a simple example, if Verizon had 1 million lines in 2001, 2 million lines in 2002 and 3 million lines in 2003, and Verizon's costs were divided by 1 million lines to determine the cost per line for the three-year period, Verizon would recover twice its costs over the three-year period. For similar reasons, in calculating costs for USF purposes, the Commission has emphasized the need to update line count data frequently. *See* Universal Service 12/18/01 Order (explaining that non-rural support amounts will continue to be adjusted each quarter to account for growth; as the Virginia cost model will not be adjusted each quarter, line growth must be accounted for in advance).

Exh. 109 (Murphy Reb.) at 33. This complaint is without merit. The original data significantly *overstated* the number of customer locations because the model used the maximum number of locations from two different data sources and treated every household and business as a separate location, without taking into account the presence of many customers in high rise buildings. AT&T/WCOM Exh. 14P (Pitkin Surreb.) at 61, Tr. 4404 (Pitkin). This undercuts any concern about the failure to update the number of customer locations. Moreover, Verizon's own cost models also presume that growth in line counts has all occurred at existing locations, AT&T/WCOM Exh. 15P (Baranowski Surreb.) at 11, and this Commission has done the same. *See* Universal Service 12/18/01 Order.

b. Line Counts in Verizon's Model

In calculating costs per line, Verizon uses line information from 2001 and does not make any adjustments to account for increased demand over the three-year planning period (much less over a period of time sufficient to use up the substantial spare capacity it has built into its network to account for growth). To take account of this growth, AT&T and WorldCom adjusted Verizon's studies to account for the three percent annual growth that occurs on average in Verizon's network and the resulting decline in average cost per line that is associated with such growth over the planning period. AT&T/WCOM Exh. 12 (AT&T/WorldCom Recurring Cost Panel Reb.) at 79. Verizon nowhere argues that this adjustment is inappropriate.

Moreover, in its initial filing, Verizon did not even spread costs over all the 2001 lines. After reviewing AT&T and WorldCom's rebuttal testimony, Verizon acknowledged that it had excluded approximately 300,000 loops from its loop study and restated its loop costs in its surrebuttal testimony. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 74-76. Not surprisingly, adding these lines to the Verizon cost study decreased the average cost per loop. AT&T and WorldCom's Panel Rebuttal restatement of loop costs was based on Verizon's

original loop count included with its July 2 cost model. Because the AT&T and WorldCom restatement did not reflect the increased number of loops,[111] its restated costs were actually overstated. Because Verizon did not produce the electronic files supporting its new line counts and restated loop costs until after the loop panels appeared at the FCC hearings, AT&T and WorldCom were unable to update the restatement of Verizon's studies.[112] AT&T and WorldCom have now had an opportunity to review Verizon's new electronic files and to make the changes identified in the Panel Rebuttal testimony to the updated Verizon cost studies. The updated restatement results are set forth in Appendix 1 to this brief.

2. DS-0 equivalents of DS-3 and DS-1

Verizon's network includes not only DS-0 services but also DS-1 services, DS-3 services, and other higher bandwidth services. Accordingly, a method is needed to allocate shared costs in the network across these different services. The Synthesis Model allocates costs based on DS-0 equivalents, which is the same method used by the FCC for allocating costs in its USF calculations.[113] It is important that the Commission use a consistent standard to allocate shared costs to prevent distortion of costs and eliminate arbitrage opportunities. AT&T/WCOM Exh. 14 (Pitkin Surreb.) at 45-47. And it is reasonable to conclude that services that require more DS-0 equivalents have higher costs. *Universal Service Tenth Order* ¶ 392.

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[111] Nor was it possible for AT&T and WorldCom to actually change the number of loops within the Verizon model. Only Verizon has access to modify the line counts in its model.

[112] Verizon did provide electronic files supporting the average two-wire loop rate of $22.38 identified in Appendix I to its Panel Surrebuttal Testimony on October 25, two business days before the loop hearings. Tr. 4039-40 (Sanford). However, those files contained a double counting of both Verizon's original line counts and its new line counts. On November 1, 2001, Verizon produced a new set of electronic files that corrected the double counting of lines and produced a statewide average two-wire loop rate of $22.33.

[113] The Synthesis Model is quite conservative in its use of DS-0 equivalents. Unlike the FCC's version of the model, the Synthesis Model calculates investment in loop plant by constructing an individual loop for each DS-0 equivalent reported in ARMIS.

Verizon criticizes the use of DS-0 equivalents in the Synthesis Model to allocate costs and argues that costs should be allocated based on physical pairs. Having argued in favor of using physical pairs, Verizon refused to provide data on physical pairs to AT&T and WorldCom in discovery. AT&T/WCOM Exh. 12 (Pitkin Surreb.) at 48 & n. 42; Tr. 4520-21 (Pitkin). Verizon cannot have it both ways. If it believes that physical pairs are the appropriate allocator for shared costs, then it cannot refuse to provide data at the heart of that allocation issue. Furthermore, Verizon's advocacy of allocation of costs on a physical pair basis is nothing more than a litigation argument, as Verizon itself uses DS-0 equivalents in its own cost study to allocate the cost of fiber, poles and conduit. ATT/WCOM Exh. 14P (Pitkin Surreb.) at 47; ATT/WCOM Exh. 15P (Baranowski Surreb.) at 7-8. Moreover, the use of DS-0 equivalents for allocating investments is commonplace in the industry, and BellSouth's witnesses have testified that it is appropriate.[114]

Verizon acts as if use of DS-0 equivalents understates costs, but in fact the issue relates only to cost allocation. Tr. 44603-04 (Pitkin). If costs were allocated on a physical pair basis, the costs of DS-0 services would increase but the cost of higher bandwidth services would decrease correspondingly. ATT/WCOM Exh. 12 (Pitkin Surreb.) at 46-47.

Moreover, AT&T and WorldCom did not build into the Synthesis Model 24 DS-0s for every DS-1 and did not allocate costs on that basis. Based on the only data Verizon provided, AT&T and WorldCom had available the number of DS-0s associated with POTs lines in ARMIS, the number of DS-0s associated with special access lines, and a separate number of

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[114] *See Investigation into Pricing of Unbundled Network Elements*, Docket No. 990649-TP, Final Order on Rates for Unbundled Network Elements Provided by BellSouth, Order No. PSC-01-1181-FOF-TP, May 25, 2001, at 135 (Fla. Pub. Serv. Commn)(approving BellSouth recommendation to use DS0 equivalents); *In re Final Deaveraging of BellSouth Telecommunications, Inc., UNE Rates pursuant to FCC CC 96-45 9th Report and Order on 18th Order on Reconsideration*, Docket No. U-24714-A, Sept. 19, 2001 (Louisiana Pub. Serv. Commn Ex Parte) (adopting use of DS-0 equivalents).

physical private line loops. The reported number of DS-0s associated with special access lines translated into a ratio of 8 DS-0 equivalents per physical line. AT&T/WCOM Exh. 1 (Pitkin Dir.) at 25. Thus, in order to recover the investment in the Synthesis Model, AT&T and WorldCom calculated DS-1 and DS-3 costs using reasonable assumptions about relationships between DS-1s and DS-3s so that the ratio of 8 DS-0s per physical line was maintained. *Id.* at 25. During the hearing, Mr. Pitkin showed why these assumptions were necessary and why an assumption of 24 DS-0s per DS-1, given the inputs used in the Synthesis Model, would have led to an over-recovery of the investment. Tr. 4479-86, 4525-27 (Pitkin); AT&T Ex. 129. Moreover, the relationships used in calculating DS-1 and DS-3 costs are validated by Verizon's own models. AT&T/WCOM Exh. 14 (Pitkin Surreb) at 51.

3. Synthesis Model Road Factor

AT&T and WorldCom have reduced the road factor in the Synthesis Model from 1.0 to 0.9 to correct for the Synthesis Model's use of surrogate customer location data that overstates dispersion and inflates the amount of cable and structure needed. AT&T/WCOM Exh. 1 (Pitkin Dir.) at 21; Tr. 4563-66 (Pitkin). In the *Universal Service Tenth Order*, the Commission rejected a downward adjustment in the road factor because there was no reliable source to compare actual customer locations with surrogate locations and thus to determine whether the road surrogate algorithm overstated customer dispersion. *Id.* at 46; 82. Subsequently, staff of the Kansas Corporation Commission conducted just such an evaluation and determined that the cable quantities produced by the Synthesis Model were greater than those in the SBC embedded network. AT&T/WCOM Exh. 1 (Pitkin Dir.) at 21. The Kansas Commission therefore reduced the distribution distance produced by the Synthesis Model by 15%. In addition, BellSouth's new cost model, which is based on geocoded data, generates about *half* the distribution route miles of the FCC's default model when modeling the same

network. *Id.* Thus, there is no longer any doubt that use of a road factor of 1.0 in the Synthesis Model overstates dispersion.

Verizon responds that in Virginia, ARMIS sheath distances are greater than the distances in the FCC's default model. Verizon Ex. 109 (Murphy Reb.) at 102-03. However, a comparison of ARMIS sheath distances with route distances in the Synthesis Model is meaningless. In Verizon's embedded network, Verizon is likely to have duplicative sheaths along many routes as a result of plant reinforcement and use of copper and fiber on the same route. AT&T/WCOM Exh. 14P (Pitkin Surreb.) at 57-58; AT&T/WCOM Exh. 18P (Riolo Surreb.) at 19-20. Moreover, a TELRIC model should produce significantly less sheath distance than an embedded network because the model designs routes efficiently, rather than building them piecemeal to address incremental demand as it develops. AT&T/WCOM Exh. 14P (Pitkin Surreb.) at 57.

In contrast to Verizon's comparison of sheath distances in ARMIS, the Kansas staff did a detailed evaluation of sheath feet in specific wire centers and concluded that use of a road factor of 1.0 overstates the amount of cable and structure needed. AT&T/WCOM Exh. 14P (Pitkin Surreb.) at 58. And use of BellSouth's model shows that a TELRIC model that uses geocoded data produces far less cable and structure than would be produced using a road factor of 1.0. The downward adjustment made by AT&T and WorldCom is conservative in light of the existing data.

4. Maximum loop length

Verizon—which uses a maximum copper loop length of 12,000 feet in its cost studies—contends that the Synthesis Model, by permitting maximum copper loop lengths in excess of 12,000 feet beyond the feeder/distribution interface, violates the Carrier Serving Area

("CSA") design standards and constructs a network incapable of providing advanced services. Verizon Exh. 109 (Murphy Reb.) at 19. Tr. 4053, 4400 (Murphy). Indeed, Verizon asserts that "*[a]ny* deviation from these CSA standards could prevent the delivery of these services and would introduce inefficiencies in the incumbent carrier's operations." Verizon Exh. 109 (Murphy Reb.) at 19 (emphasis added). Verizon's analysis is fundamentally flawed in several important respects.

First, Verizon concedes that the CSA 12,000 foot constraint is not an "absolute ceiling." Tr. 4053-4054 (Murphy). Indeed, even the flexible CSA standard allows some loops to exceed 12,000 feet. AT&T/WCOM Exh. 18P (Riolo Surreb.) at 3.[115]

Second, Verizon's argument is nothing more than a rehash of arguments that this Commission has previously considered and rejected. AT&T/WCOM Exh. 14P (Pitkin Surreb.) at 32-33; AT&T/WCOM Exh. 18P (Riolo Surreb.) at 3. In this regard, the Commission has already found that copper loops of 18,000 feet in length are appropriate for the provision of services that meet quality standards for universal service, stating:

> We conclude that the federal mechanism should assume a maximum copper loop length of 18,000 feet. The record supports the finding that a platform that uses 18,000 foot loop-lengths will support at appropriate quality levels the services eligible for universal service support. Although BCPM has presented evidence that the provision of some, high-bandwidth advanced services may be impaired over 18,000 foot loops, we conclude that the BCPM sponsors have not presented credible evidence that the 18,000 foot level will not provide service at an appropriate level, absent the use of expensive DLC line cards. . . We find that the public interest would not be served by burdening the federal universal service support mechanism with the additional cost necessary to support a network that is capable of delivering very advanced services, to which only a small portion of customers currently subscribe. Accordingly, we conclude that the federal mechanism should assume a maximum copper loop length of 18,000 feet.

[115] *See also* AT&T Ex. 117 at D2, D3 (noting that loops in rural areas exceed CSA standards).

Universal Service Fifth Order ¶ 70 (footnotes omitted). Accordingly, the use of an 18,000 foot loop is fully consistent with the Commission's previous determination.

Third, copper loops up to 18,000 feet as designed by the Synthesis Model can support advanced services. AT&T/WCOM Exh. 18P (Riolo Surreb.) at 4-5. Notably, Verizon has admitted that it "offers ISDN and DDS services in all areas of Virginia as allowed by the transmission characteristics of the plant, and that "[i]t is likely that some of these services have been provisioned in areas designed before the current CSA guidelines were in practice . . . ." AT&T/WCOM Exh. 126 (Response to AT&T/WorldCom 10-33). Thus, by Verizon's own admission, its outside plant includes loops which provide advanced services and which violate CSA standards.[116]

Furthermore, although Verizon states broadly that copper loop lengths in excess of 12,000 feet are somehow incapable of providing advanced services, Verizon has not identified and cannot identify a single loop modeled by the Synthesis Model that exceeds the so-called CSA copper loop length constraint that is incapable of supporting advanced services. *See* AT&T/WCOM Exh. 118 (Response to AT&T/WorldCom 10-28). Moreover, Verizon's argument regarding the Synthesis Model's violation of purported CSA standards relates to a tiny fraction — fewer than 1% of the loops "constructed" by the Synthesis Model. Thus, not only is Verizon's argument regarding the inherent limitations of the loops modeled in the Synthesis Model erroneous, but its insignificance belies Verizon's claim that the entire network constructed by the Synthesis Model is wholly incapable of providing advanced services in a forward-looking environment. AT&T/WCOM Exh. 14P (Pitkin Surreb.) at 32-33.[117]

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[116] *See also* Tr. 3207-3208 (Murray) (noting that Verizon's network has not been built ubiquitously to CSA standards).

[117] *See also* Tr. 3207-3208 (Murray) (noting that "a relatively small percentage of loops" constructed by the Synthesis Model exceed 12,000 feet).

5. Size of Distribution Areas

Verizon claims that the Synthesis Model oversizes distribution areas by including more than 200-600 living units. Verizon Exh. 109 (Murphy Reb.) at 27-29. This criticism is without merit. As AT&T/WorldCom witness Joseph Riolo demonstrated in his surrebuttal testimony, the distribution area is flexible in the number of living units that it can contain, and there is no 600 living unit limitation. In fact, technology changes have made larger distribution areas not only feasible but also advisable depending on the size of the SAI. This fact is confirmed by Verizon's network, which includes distribution areas that significantly exceed 600 living units. AT&T/WCOM Exh 18P (Riolo Surreb.) at 7-9.

6. Cable sizing and selection

The Synthesis Model calculates cable size based on working lines and target fill factors. Verizon does not challenge this method. In contrast, Verizon substantially underestimates cable size, and thereby overstates cable unit costs, by calculating cable size *before* applying any utilization factors. Verizon sizes metallic cable based on the average number of working lines within each wire center. Only then does Verizon increase costs by application of a distribution utilization factor or feeder utilization factor. Tr. 4211-12 (Sanford). For example, as the AT&T/WorldCom Recurring Cost Panel explained, if Verizon's Model assumed 300 working lines in a particular distribution area, the Model would base the unit costs of cable on the cost of a 300-pair cable – even though a 600-pair cable would be used if, as Verizon posits through its distribution fill factor of less than 50%, more than 600 pairs were actually needed at the distribution area. As a result, Verizon underestimates cable size and overestimates costs. AT&T/WCOM Exh. 12P (AT&T/WorldCom Recurring Cost Panel Reb.) at 38-39.

Verizon's own surrebuttal testimony illustrates the impact of its methodology. Verizon states that it is much more efficient to install additional distribution cable in advance to provide for growth because, for example, "an increase in capacity of 100%, provisioning a 100 pair cable instead of a 50 pair cable, increases the investment by only 19%." Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 123. This may be true, but not in Verizon's models. An increase in capacity of 100%, from 50 working pairs to more than 100 working and non-working pairs, increases costs by 100%, as the models establish prices as if two 50-pair cables were used.

Verizon acknowledges that if there were 300 total working pairs in a UAA, Verizon's loop study "would calculate copper distribution cable costs based on a 300-pair cable," even though there were more than 600 pairs in the UAA when non-working pairs were included. *Id.* at 99. Verizon's calculation of cable size based only on working pairs thus understates cable size. Verizon does not dispute this understatement but suggests that this error is offset by another error in its model – the failure to account for the possibility that multiple cables would be used in a particular UAA.

However, it is not AT&T and WorldCom that incorrectly assumed that a single cable would always serve a particular UAA – that is the assumption that Verizon used in its Model. Tr. 4452-53 (Baranowski). Indeed, the Synthesis Model does not make such an assumption; it calculates how many cables would efficiently be used in a particular UAA. Tr. 4458 (Pitkin). Verizon's claim that by making this assumption it overstated cable size and offset its error in calculating cable size based only on working lines is unproven. Tr. 4457 (Baranowski). Further, that assumption is likely wrong. It is quite possible that a single cable would be used in many UAAs – or that one large cable would be used for most of the route distance served in the UAA with smaller cables used only for short distances.

Verizon's cable sizing practices are clearly irrational, and there is no evidence that its two errors offset each other.

7. Cable Unit Costs

Verizon does not question the cable unit costs used in the Synthesis Model. The cable unit costs in Verizon's studies, however, are too high. Verizon bases its cable costs on information contained in its VRUC database from 1997 to 1999. Although this information ostensibly reflects the actual cost of cable, Verizon acknowledged in its surrebuttal testimony that it used estimation techniques. Moreover, Verizon calculates the cost of cable based on three years of data, one of which appears to be entirely aberrational. Elimination of the outlier data yields more accurate cable costs.

The cable costs used in Verizon's Model do not appear to be actual cable costs but rather estimates. The price per foot is consistently 44.46 percent higher in 1998 than in 1997 across various cable sizes, which would be highly unlikely if actual cable costs were used. AT&T/WCOM Exh. 12P (AT&T/WorldCom Recurring Cost Panel Reb.) at 33. In addition, the inputs Verizon uses for cable costs show the exact same incremental increase in the cost per foot of cable from 300 to 600 pair cable and from 600 to 900-pair cable for aerial, buried and underground plant. *Id.* at 35-36. Verizon claims that it determines its total cable costs and then allocates these costs among different cable sizes and structure types based on an estimation technique. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 87-92. But Verizon nowhere demonstrates that this estimation technique is accurate or reasonable. To the contrary, the consistent increases in cable cost across different cable sizes and structure types over the three year period suggests that the technique for allocating cable costs is inaccurate. AT&T/WCOM Exh. 12P (AT&T/WorldCom Recurring Cost Panel Reb.) at 36.

More importantly, Verizon's method of determining the *overall* cable costs is inaccurate. Verizon determines cable costs based on linear regression of cable costs in the years 1997 to 1999. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 93. But the cable costs Verizon reports for 1998 are 44.46% higher than in 1997 for underground cable, 23.3% higher than 1997 for aerial cable, and 25.2% higher for buried cable. AT&T/WCOM Exh. 12P (AT&T/WorldCom Recurring Cost Panel Reb.) at 33-34. The 1998 cable prices are also vastly more expensive than the 1999 prices. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 94. Clearly, inclusion of the 1998 data significantly distorts the results. In its restatement of Verizon's costs, AT&T and WorldCom used the 1997 prices adjusted forward to 2001.

Verizon responds that the 1997 data may have been exceptionally low, which is why it used a sample of three years. *Id.* at 93-95. But the 1997 and 1999 data are similar and much lower than the 1998 data, and Verizon made no effort to evaluate why the 1998 cable costs were so much higher than those in 1997 and 1999. Tr. 4270-71 (Sanford). Thus, it is only reasonable to presume that the 1997 and 1999 data more accurately reflect the likely cost of cable on an ongoing basis.

8. DLC Costs

a. The Assumed Mix Of DLC Technology

A new entrant employing the least cost technology would deploy exclusively GR-303 technology for DLC in its network.[118] Verizon's own witness, Mr. Gansert, acknowledged

[118] The efficiency of GR-303 also is apparent from the fact that "[m]ost CLECs transport the unbundled loops back to their central offices (switches) using GR-303 IDLC systems." AT&T Ex. 122, Telcordia Notes on the Networks, Oct. 2000 at 12-52. ILECs are also deploying GR-303. U.S. West and SBC began deploying GR-303 in 1998. WorldCom Ex. 116 at 5; WorldCom Ex. 117 at 8-9. **[BEGIN VERIZON PROPRIETARY]** [redacted] **[END VERIZON PROPRIETARY]** The ILECs have recognized the cost savings associated with GR-303. WorldCom Ex. 117 at 10.

that much, if not all, of the IDLC deployed by an entrant unconstrained by Verizon's existing switches would be GR-303. Tr. 4556 (Gansert). **[BEGIN VERIZON PROPRIETARY]** [redacted]

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[119] Verizon states that these guidelines "are goals that encourage the use of GR-303 IDLC in growth scenarios, where new plant is being added to the network." Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 83. But it is exactly such guidelines that reveal the most efficient technology to use in a reconstructed network, unconstrained by the technology already deployed in the network.

[120] **[BEGIN VERIZON PROPRIETARY]** [redacted] **[END VERIZON PROPRIETARY]**

document suggests that GR-303 deployment will be limited in Verizon East because of the constraints of Verizon's existing network [121] **[END VERIZON PROPRIETARY]**

While Verizon acknowledges that much of the IDLC employed by a new entrant would be GR-303 (and fails to explain why any would be TR-008),[122] Verizon argues that a new entrant would use UDLC to provide non-switched services, ISDN, and unbundled loops.[123] This is incorrect. **[BEGIN VERIZON PROPRIETARY]** [redacted] **[END VERIZON PROPRIETARY]** Other Verizon documents, as well as documents from

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[121] Verizon states that the reason it will deploy TR-008 in its own network in Verizon East is because of startup costs associated with GR-303 that make it less efficient to use GR-303 if only a small volume of GR-303 is going to be deployed because some of Verizon's existing switches are not GR-303 compatible. Tr. 4150-52, 4158-59, 4175-76 (Gansert); Verizon Exh. 107 (Verizon Cost Panel Dir.) at 91 Mr. Gansert explained that if you are not going to supply a large amount of GR-303, it does not make sense to deploy GR-303 – especially in a world that may soon change to packet switches. "[T]o operate efficiently, you really want to deploy that operating paradigm [GR-303] across the whole universe." Tr. 4170-71. Verizon West apparently performed a major replacement of the digital systems which, in Verizon's view, explains why Verizon West is deploying GR-303. Tr. 4172 (Gansert). All of this shows that a new entrant deploying a large number of new switches and loops would certainly choose GR-303.

Similarly, in its written testimony, Verizon's reasons for the low level of GR-303 in its models all relate to the constraints of its existing network – (1) there is no reason to replace TR-008 technology that has already been purchased; and (2) there is a need to coordinate switch and feeder deployment. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 82-83. "[T]he huge existing investment in modern digital switch ports that support TR-008 would have to be replaced and stranded to deploy the GR-303 interface widely." Verizon Exh. 107 (Verizon Cost Panel Dir.) at 91. Verizon's critique of AT&T and WorldCom's argument for extensive deployment of GR-303 is that it assumes a scorched-node approach. Verizon Exh. 122 (Verizon Recurring Cost Panel Surreb.) at 82. Of course, that is exactly the approach that should be used to evaluate forward-looking costs.

[122] Verizon's assumptions about the amount of TR-008, as compared with GR-303, in its models had nothing to do with the different functional capabilities of the technologies. Tr. 4153 (Gansert).

[123] Verizon acknowledges that all its switched services could be provided using GR-303. Tr. at 4147 (Gansert).

other ILECs and from Telcordia make this clear as well. *See, e.g.*, AT&T Exh. 124, *NYNEX Loop Technologies Application Guidelines*, March 1997, at 38 (GR-303 is an efficient means of providing ISDN); WorldCom Exh. 117, *GR-303 Deployment: An ILEC Perspective*, July 1998, at 10 (GR-303 supports non-switched services and ISDN). Indeed, Mr. Gansert noted that Verizon's plan in 1997 was based on the assumption "that all unbundled loops will be provided over GR-303." Tr. 4077.[124] *See also* AT&T/WCOM Exh. 12P (AT&T/WorldCom Recurring Cost Panel Reb.) at 23, 28-29; AT&T/WCOM Exh. 13 (AT&T/WorldCom on Non-Recurring Costs Panel Reb.) at 15-18 (describing technical feasibility).

While Verizon at times appears to dispute the conclusions of these documents, in the end, Verizon acknowledges that unbundling, for example, is "hypothetically possible," and Mr. Gansert was forced to admit that Mr. Riolo's diagram described unbundling using GR-303.[125] Tr. 4611-17 (Riolo, Gansert). He also stated that "[w]e never denied there was a hypothetical architecture that could be created to do electronic unbundling using GR303." Tr. 4185. **[BEGIN VERIZON PROPRIETARY]** [redacted] **[END VERIZON PROPRIETARY]** Thus, Verizon retreats to the position that the OSS to enable CLECs to order unbundled loops for GR-303 has not yet been developed and

[124] Mr. Gansert later stated that some of these documents were describing unbundling of GR-303 using a UDLC arrangement. None of the documents say this, however. And all postulate significant cost savings from what Mr. Gansert describes as UDLC unbundling in a GR-303 environment. Thus, even if what Mr. Gansert calls unbundling of GR-303 using a UDLC arrangement were needed, there would be significant cost savings with GR-303 that are not accounted for in Verizon's critique. In any event, Mr. Gansert does not dispute that GR-303 unbundling is possible without any UDLC.

[125] GR-303 unbundling would use the Time Slot Interface ("TSI") feature. A basic description of that feature is described in a 1993 NYNEX document. AT&T Ex. 123. Methods of unbundling GR-303 have been known for years. WorldCom Ex.116, U.S. West 1998 Presentation, at 6-7. Mr. Gansert acknowledged that these documents described methods for unbundling. Tr. 4163 (Gansert)